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EXAMINER

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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Paper No. 9

Application Number: 09/772,001
Filing Date: January 30, 2001
Appellant(s): FUJII ET AL.

Csaba Henter
For Appellant

EXAMINER'S ANSWER

MAILED
SEP 15 2003
GROUP 1700

This is in response to the appeal brief filed 6/30/03

(1) *Real Party in Interest*

A statement identifying the real party in interest is contained in the brief.

(2) *Related Appeals and Interferences*

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

(3) *Status of Claims*

The statement of the status of the claims contained in the brief is correct.

(4) *Status of Amendments After Final*

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) *Summary of Invention*

The summary of invention contained in the brief is correct.

(6) *Issues*

The appellant's statement of the issues in the brief is correct.

(7) *Grouping of Claims*

Appellant's brief includes a statement that claims 1-20 do not stand or fall together and provides reasons as set forth in 37 CFR 1.192(c)(7) and (c)(8).

(8) *Claims Appealed*

The copy of the appealed claims contained in the Appendix to the brief is correct.

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(9) Prior Art of Record

US 5,973,004	Lutz et al	10-1999
US 5668210	Harris et al.	09-1997

(10) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1-20 are rejected under 35 U.S.C. 103(a). This rejection is set forth in prior Office Action, Paper No. 6 and the relevant portion is reproduced below. The numerals in parentheses refer to the column and line numbers in the cited reference.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 5973044 to Lutz et al. in view of US Pat. 5668210 to Harris et al.

The invention is directed towards a surface treatment agent and a resist patterning process using the agent.

The claims disclose an organic-siloxane containing adhesion promoter or primer. The siloxane comprises a functionally substituted alkylene (R^1), an alkyl radical (R^2), a hydrolysable group of alkoxy radical (OX) bonded to a siloxane (SiO). The substituting functional group (Y) in R^1 is chosen from amino, mercapto and isocyanate among others.

The primer is formed by the hydrolysis of a silane comprising the units R^1 and R^2 as above and a hydrolyzable alkoxy group (OZ) bonded to Si.

The use of silane and siloxane containing polymeric compositions as adhesion promoters and primers is well known (Lutz: 1;10-2;20). Lutz teaches its application in electronics (5;56-59). Lutz teaches an organosilane-containing adhesion promoter taught in prior art (8;5-13). The compound CA-4 (3-glycidoxipropyltrimethoxysilane) is similar to the claimed material for the primer (claim-2) comprising the radicals (R -sup-1, R -sup-2, alkoxy and silane). The siloxane contains the radicals used in the instant claims 8-15 (3;35-4;35). Lutz teaches that the material CA-4 did not perform well in the adhesion tests conducted (9;55-10;2). The improved adhesion of the same compound with alcohol and Lutz's inventive siloxane is discussed (10;3-60).

Lutz teaches the preparation of an organo-siloxane adhesion promoter and primer by reacting an alcohol, and organo-siloxane and a silane (2;35-67). It teaches the formation of siloxanes by hydrolysis of the reactive groups in the ingredients (5;31-51). Lutz teaches the specific silane as a starter Lutz teaches the hydrolysis of silanes to siloxanes. It teaches that siloxanes containing primers improve the adhesion of polymers.

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Lutz does not teach the specific siloxane primer. Lutz does not teach the use of the primer to promote adhesion of photoresist to metal (or metal oxide) or the patterning of the resists (claims 4-6).

Harris teaches the formation of primers and adhesion promoting agents. The primer is used to bond another polymer to a substrate (4;67-5;2). A thin layer is coated (6;11-16). The substrates may be metals and metal oxides used in electronics (5;57-67). The overcoated polymer may be photosensitive and cured by radiation. Alternatively, the primer may be mixed with the photoresist, applied and baked prior to exposure (6;11-31). Harris teaches the hydrolysis of organo-silanes in the presence of water to form the primer (6;40-8;9).

Harris does not specifically teach the patterning of photoresists. It is well known in the art that photoresists are applied in electronics manufacturing for patterning substrates and is admitted prior art by Appellant.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use an organo-silane compound as a primer to increase the adhesion of photoresists to substrates as taught by Harris because it teaches that it is conventional in the art (1;19-50) and to form the compound by partial hydrolysis of a silane as taught by Lutz. Harris's examples further prove that there is reasonable expectation of so improving the adhesion by using partially hydrolyzed silanes.

(11) Response to Argument

Appellant states that the instant invention provides a surface treatment agent used in resist patterning which promotes the adhesion of the resist to the substrate.

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(Instant brief: p.2; item (5)). It may be noted at the outset that Appellant admits that the use of primers to promote the adhesion of photo-resists to substrates is known in prior art. The primers are silazanes and silane monomer groups. (instant specification: p.1;ll 19-32). According to the Appellant, the improvement comprises a broad class of "silicon containing oligomeric or polymeric compounds bearing certain types of functional groups [that] greatly increase the adhesion between a photoresist film and a metal or metal-oxide substrate" (instant specification: p.2;lines 4-7).

Claim 1 recites the *composition* of a "surface treatment agent" (primer) comprising the radicals R^1 (alkyl with a hydrolysable substituent group Y), R^2 (alkyl), a hydrolyzable alkoxy group or a hydroxyl (OX) and a siloxane (SiO).

A precursor to the above composition is a hydrolysable silane comprising the radicals R^1 (alkyl with a hydrolysable substituent group Y), R^2 (alkyl), and a hydrolysable group (OZ) with a silane (Si) is recited in claim-2. A starting material provided in the examples is 3-aminopropyltriethoxysilane (instant specification; p.6; Table-1). The resultant is designated as surface treatment agent A. Agent C is prepared from *two* precursor silane compounds.

A method of using the primer is recited in claim 4, to promote the adhesion of a resist pattern to a substrate.

Examiner has shown in the rejection that (a) the *broad class* of organo-siloxane polymers, with adhesion-promoting properties are well known in the art and the claimed compositions are the same as those in the cited references (b) the precursor silane and a method of making the class of siloxane polymers by partial hydrolysis of the precursor

is well-known and common place and (c) a method of using it with a photodefinable polymer would have been obvious, from the cited references, to one of ordinary skill in the art.

Appellant does not dispute that Lutz teaches the adhesion promoting properties of the organo-polysiloxanes of the instant class and its use to strengthen the adhesion of organic polymers to substrates. Appellant states "Lutz adds the adhesion promoter to the siloxane component whose adhesion is to be enhanced". Appellant narrowly argues that (d) Lutz does not teach the *use* of the compound as a primer. In the instant brief (p.3) Appellant states " Lutz does not teach primers". It is to be noted that claim 1 recites a composition. The preamble to the claim defines the intended use of the compound and does not further define or modify the composition recited by formula (1) of the claim. The pre-amble thus deserves no patentable weight. Furthermore the instant composition is taught by the cited references; its mode of use either as a compound coated on the substrate or alternatively or as an additive mixed with the photoresist does not alter the initial composition. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951).

Examiner notes that the Appellant admits that the use of primers to promote the adhesion of photo-resists to substrates is known in prior art. The primers are silazanes and silane monomer groups (instant specification: p.1;ll. 19-32). Appellant claims to have discovered "silicon containing oligomeric or polymeric compounds bearing certain types of functional groups [that] greatly increase the adhesion between a photoresist film and a metal or metal-oxide substrate". It will be shown below that the cited references teach the class of compounds and the mode of use.

Examiner agrees, that although Lutz's organo-polysiloxanes are the same as those of the instant claims and teach the adhesion-enhancing properties of the organo-polysiloxanes, it does not explicitly teach their use as primers separate from other organic polymers whose adhesion is increased. It however does teach the addition of the adhesion-promoting polymer to another UV curable polymer as acknowledged by the Appellant. Appellant contends that Lutz adds the adhesion promoting siloxane to another polysiloxane and that this would "materially affect the basic and novel properties of invention. A careful reading of Lutz would reveal the inconsistency of the argument. Lutz formulates an adhesion promoting alkoxysiloxane and adds it to another siloxane polymer. This polymer is a methyl-vinyl-polysiloxane (Lutz:6;21-25). This polymer is the same as that claimed in the instant invention comprising an alkyl radical, a *hydroxyl (OX) terminated vinyl radical* and a siloxane group. (SiO). Instant claim 9 lists a *vinyl radical* as a possible radical. Further Appellant has used mixed polysiloxanes similar to those of Lutz as shown by surface treatment agent C in the instant specification (Instant specification: p.6;Table-1). Lutz's invention is the same as

the Appellant's – only the mode of use differs. Lutz's invention is directed towards a *coating composition* with increased adhesion to metals. The instant invention uses the same compositions as a *primer* for increased adhesion to metals.

Appellant argues in the instant brief that Lutz does not teach *increased* adhesion to metal substrates by the use of the adhesion promoters comprising organo-polysiloxanes. This argument is without merit. Lutz teaches that the class of organo-polysiloxanes of the instant invention is *designed* to enhance adhesion to metallic substrates (Lutz:4;1-6). A careful reading of Lutz would show that the adhesion of the UV curable polymer to metal increased as a result of the addition of the adhesion promoter . Note that the UV-curable polymer without the organo-polysiloxane did not pass the adhesion test (Lutz: 11;19-37).

Appellant acknowledges the teachings of Harris with reference to the use of primers known in prior art but proceeds to dismiss the reference because the silanes are not similar to those of the instant invention and their use with a *resist* pattern is not explicitly mentioned. It can be shown that Harris teaches the use of primers formed by the partial hydrolysis of the same silanes that are claimed by the Appellant. It can be shown that Harris teaches the use of the adhesion promoter with a UV-patterned polymer.

Harris states “ It is known to use hydrolyzed alkoxysilanes as adhesion promoters or coupling agents for various polymeric materials. The hydrolyzed alkoxysilanes are typically used as a primer layer, i.e. they are applied to the substrate first followed by application of the polymeric material.” (Harris:1;19-23). It may be

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noted that the *typical* use of an adhesion promoter is as a primer – i.e. separate from the organic polymer. One prior-art application teaches that hydrolyzed alkoxysilanes can be used as primers for increasing the adhesive strength of arylcyclobutene polymers such as (BCB) benzocyclobutene to substrates (Harris:1;33-35). Harris' invention suggests that the same adhesion promoting agents may also be incorporated into the polymers performing the same function. Harris' BCB is a *photodefinable polymer* or photoresist and can be patterned using most conventional radiations (Harris: 6;26-31). In one example, the BCB with the adhesion-promoting agent is exposed through a photomask after coating on a metal substrate and developed to produce an image (Harris:14;56-60). It is to be noted that the resist comprises BCB and the adhesion promoting agent obtained by hydrolysis of an alkoxysilane (3;31-44). A practitioner of the art, would recognize that adhesion-promoting agents may be used as primers or incorporated into the photoresist without loss of function. The argument that Harris' primers are not similar to those of the instant claims is not persuasive. The alkoxysilanes include the class 3-aminopropyltrialkoxysilanes (Harris:3;5-16) which class includes the starting material-A specified by the Appellant in Table-1 and has been noted above. Further confirmation that the compositions are identical is given by Harris(Harris: 3;29). Thus Harris teaches the use of primers. It teaches the equivalent use of primers as "coupling agents for a polymer or as adhesion-promoters incorporated in the same polymer; there is no loss of function. It teaches using a photomask to define a pattern on the polymer.

Appellant has argued (Appeal brief: p.5) that the curing temperatures used by Lutz are lower than those of the instant claims. A careful examination shows that the primer of the instant invention is cured at 80-120 deg.C. for 120 seconds (Instant specification: p. 6;lines 17-22) whereas the cited reference teaches curing for 30 minutes at a lower temperature of 70-deg.C. Room temperature curing could last several days (Lutz: 8;66-9;2 &10;55-60). The kinetics of curing a polymer should be readily apparent to a skilled artisan who would know that the curing process depends on the time and temperature of the process which may be selected at will. Appellant has merely modified a result effective variable to shorten the process time. There is no claim to the criticality of the process parameters.

Lutz teaches that organo-polysiloxanes promote adhesion of organic polymers to metallic substrates as shown above. UV curable organo-polysiloxanes are desirable in electronics (Lutz:5;56-59) which is in the same industry. In addition Lutz's is an analogous art seeking to solve similar problems of adhesion of UV-curable polymers to metallic substrates. The argument that Lutz is too remote from the art of photoresists (instant brief: p. 5) is therefore not tenable and the cited rulings of *Clay* do not apply. Further a skilled artisan would look to the broad field of polymer chemistry and adhesion promoters (silane chemistry) used in the art rather than the narrow field of photoresist as argued by the Appellant.

Appellant has argued that the starting material used by Lutz is not similar to that in the instant claims; the instant brief states (p.4) "The compound of claim 2 is not the primer". This argument is misleading and misinterprets the rejection (see rejection

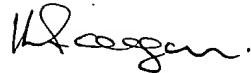
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above) which states, "The compound CA-4 (3-glycidoxipropyltrimethoxysilane) is similar to the claimed material for the primer (claim-2) comprising the radicals (R^1 , R^2 , alkoxy and silane)." The rejection states that the compound CA-4 is similar to the material *for* the primer; nowhere does the rejection claim that CA-4 is the primer itself. In a later section this is reiterated in summary where Examiner states " Lutz teaches the specific silane as a starter" (see rejection above). Appellant's examples in the instant specification (p.6, Table-1) also specifies the starting silanes and not the end-products. One of rudimentary skill in the art would know that CA-4 is a silane, the claim recites a silane as a starting material and a siloxane as the primer.

Appellant's compounds are known in prior art and their adhesion promoting properties are widely recognized as shown by Lutz and Harris. The method of using these compounds as primers is taught as prior art by Harris who teaches that there is no loss of functionality when added to photo-patternable polymers. Appellant has not shown any novel compositions or demonstrated any unexpected results.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,



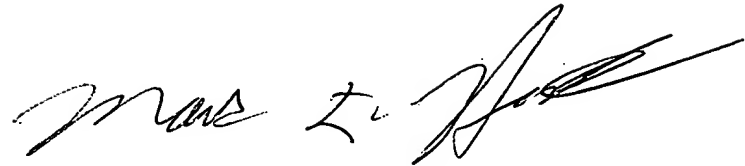
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